June 25, 1963 S. WONSO 3,095,128

CLOSURE FOR COLLAPSIBLE TUBES OR BOTTLES

Filed March 24, 1961

3 Sheets-Sheet 1

Fig.1

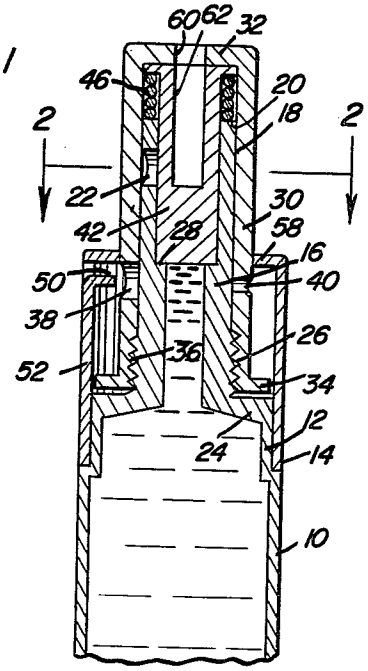


Fig.2

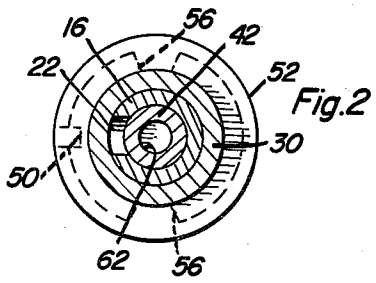


Fig.3

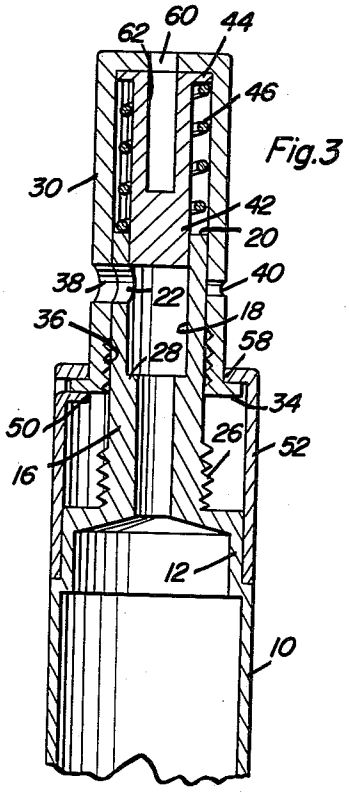
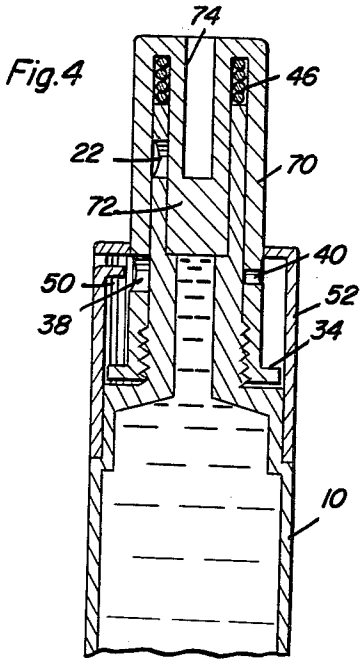


Fig.4



Stanley Wonso

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

June 25, 1963 S. WONSO 3,095,128

CLOSURE FOR COLLAPSIBLE TUBES OR BOTTLES

Filed March 24, 1961 3 Sheets-Sheet 2

Fig.5

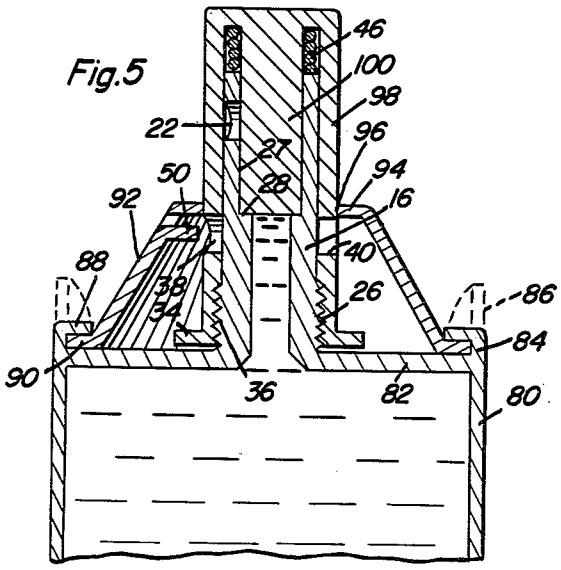


Fig.7

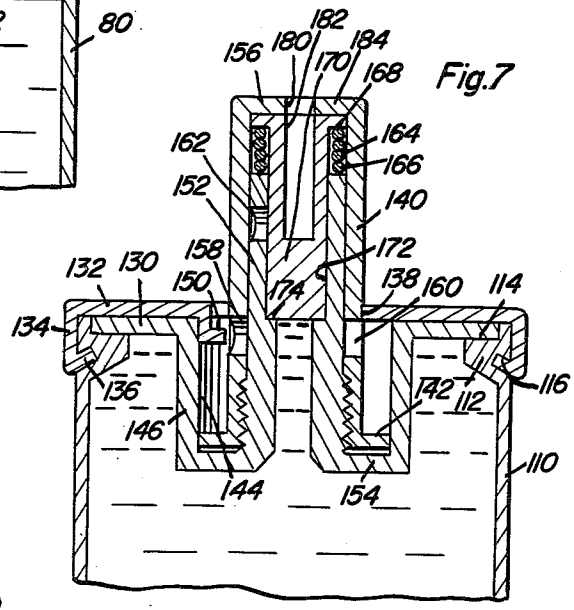
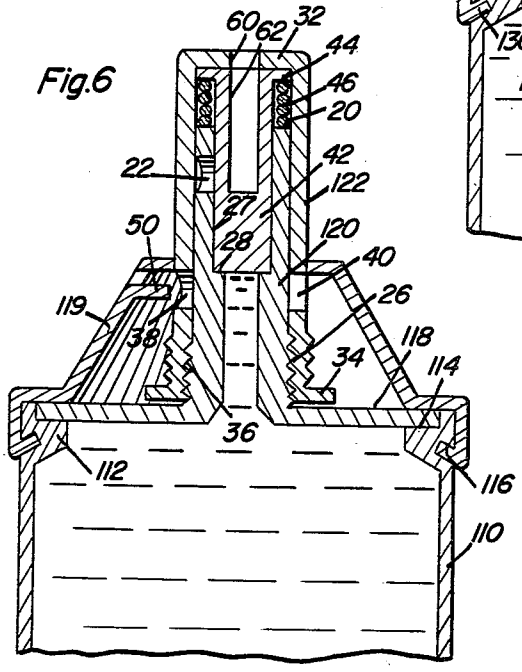


Fig.6



Stanley Wonso
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

June 25, 1963 S. WONSO 3,095,128

CLOSURE FOR COLLAPSIBLE TUBES OR BOTTLES

Filed March 24, 1961 3 Sheets-Sheet 3

Fig.8

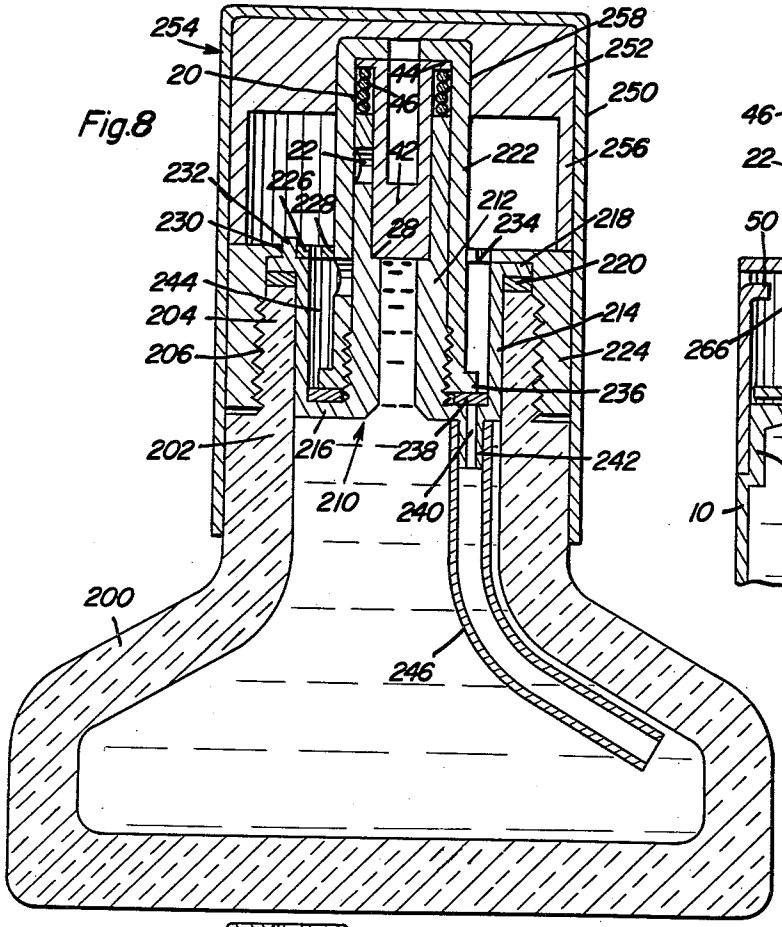


Fig.9

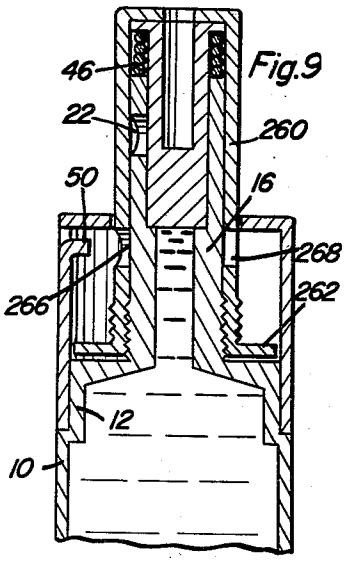


Fig.10

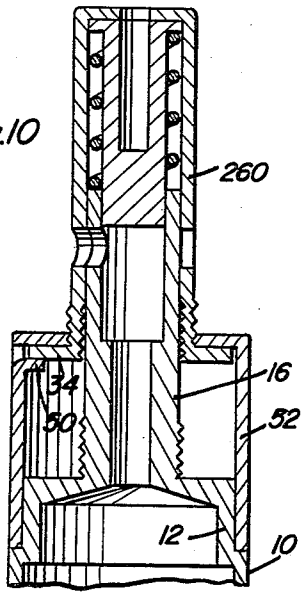


Fig.12

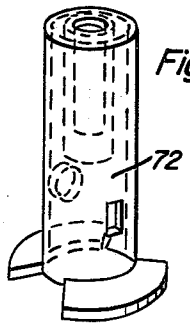
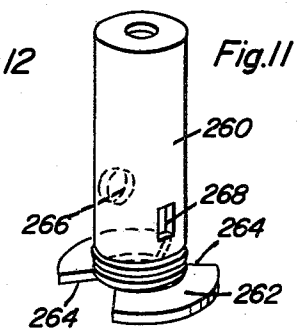


Fig.11



Stanley Wonso

INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

United States Patent Office 3,095,128
Patented June 25, 1963

3,095,128
CLOSURE FOR COLLAPSIBLE TUBES OR BOTTLES

Stanley Wonso, 9940 S. Crawford Ave., Oak Lawn, Ill.
Filed Mar. 24, 1961, Ser. No. 98,196
6 Claims. (Cl. 222—514)

This invention comprises a novel and useful closure for collapsible tubes or bottles and more particularly comprises an improved cap or closure member for use with various types of receptacles.

The primary object of this invention is to provide an automatic dispensing closure designed particularly for collapsible metal or pliable plastic tubes, glass, ceramic or rigid plastic bottles and for dispensing practically all types of products ranging from a liquid to a heavy paste.

A further object of the invention is to provide a closure in accordance with the foregoing object which shall be durable, simple in construction, of a relatively low cost, and shall be highly effective in its operation.

A still further object of the invention is to provide a closure in conformity with the above mentioned objects which shall be leak-proof, sanitary and of a pleasing and compact design particularly adaptable for use with collapsible metal tubes, or bottles.

Still another object of the invention is to provide an automatic closure device in accordance with the foregoing objects wherein the closure device shall have a lateral discharge port, external screw threads at its base and a cavity in the upper end of the neck of the closure which shall provide a seal seat between the rim and wherein the hole that communicates with the collapsible tube interior.

Still another object of the invention is to provide a closure having a quick positive opening and closing action with a cap that cannot be readily removed or lost; and wherein in its open position the cap will afford a waste-proof use of the contents of the receptacle and while in the closed position will afford a clean, leakproof and sanitary storage condition for the contents of the receptacle.

Yet another object of the invention is to provide a closure having improved means for introducing air into the void within the container at the time the contents are being dispensed in order to effect a free flow of the liquid to be dispensed therefrom, the normal closing action of the closure sealing this air vent.

Still another object of the invention is to provide a means for affixing tamper-proof seals and/or revenue and excise tax stamps in a generally acceptable manner and as required to the closure when used for bottles or other containers.

Still another specific object of the invention is to provide a novel construction of an automatically acting closure for receptacles wherein the device can readily be constructed in different arrangements to perform its desired functions in connection with different types of receptacles and wherein the moving parts of the device shall be effectively enclosed.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to the like parts throughout, and in which:

FIGURE 1 is a fragmentary view in vertical central section showing one embodiment of the automatic closure of this invention applied to a receptacle;

FIGURE 2 is a horizontal sectional detail view taken substantially upon the plane indicated by section line 2—2 of FIGURE 1 and showing with FIGURE 2 the device in the closed position thereof;

FIGURE 3 is a view similar to FIGURE 1 but showing the position of the parts when the device is in its dispensing position;

FIGURE 4 is a view similar to FIGURE 1 but showing a second embodiment or form of the automatic closure;

FIGURE 5 is a view similar to FIGURES 1 and 4 but showing a still further form of the invention in which the automatic closure is secured in a different manner to a different type of receptacle;

FIGURE 6 is a view similar to FIGURE 4 and 5 but showing still another form of the invention in which the automatic closure is secured in a different manner to a different type of receptacle.

FIGURE 7 is a view similar to FIGURE 6 of yet another embodiment of the invention and showing the same mounting arrangement of the same upon a receptacle as shown in FIGURE 6;

FIGURE 8 is a view in vertical section through a further embodiment of the enclosure applied to a glass bottle and incorporating therein an air vent automatically operating with the functioning of the closure;

FIGURE 9 is a view similar to FIGURES 1 and 4 but yet of another embodiment of the invention;

FIGURE 10 is a view similar to FIGURE 9 but showing the position of the parts when the device is in its dispensing position;

FIGURES 11 and 12 are perspective views showing the modified elements employed in the embodiments of FIGURES 9 and 4 respectively.

Reference is now made first to FIGURES 1–3 for an understanding of the basic principles of this invention as applied to a preferred embodiment for use with receptacles such as collapsible tubes.

In FIGURES 1–3, the numeral **10** designates the body portion of the receptacle having a closed lower or rear end, not shown, together with an upper or forward portion which is diametrically reduced as at **12** to provide an annular seat **14**. This upper portion terminates in a preferably cylindrical neck or stem **16** having a cylindrical counterbore **27** in its open upper end which latter terminates in an annular surface or seat **20** for a purpose to be subsequently apparent. The neck **16** is provided with a laterally positioned discharge orifice **22** by means of which the contents within the receptacle may be dispensed as set forth hereinafter.

Upon its exterior surface, and adjacent its junction with the upper end wall **24** of the receptacle **10**, the neck **16** is provided with an externally threaded portion as at **26**. The open upper end of the neck **16** has its counterbore **18** therein provided with an annular seat **28** at its lower end which constitutes part of a novel sealing means which is located inwardly or below the dispensing orifice **22** for a purpose to be subsequently set forth.

Slidably and rotationally received upon the neck **16** is a closure member in the form of a sleeve **30** which snugly embraces the exterior cylindrical surface of the neck **16** and is considerably longer than the latter. The closure sleeve **30** has an upper end wall **32** while its lower end is provided with a laterally outturned flange **34**. Adjacent its lower end the internal cylindrical surface of the sleeve **30** is provided with internal screw threads **36** which cooperate with the threads **26** at the lower portion of the neck or stem **16**. It will thus be apparent that by rotating the sleeve upon the neck, the threaded portion may be caused to selectively engage or disengage to thereby secure or lock the closure member to the neck or to release the same therefrom.

Intermediate its ends the sleeve is provided with laterally positioned discharge means which as shown in

this embodiment consists of a relatively large area orifice **38** together with a relatively smaller area discharge orifice **40**. The orifice **38** is preferably of the same cross sectional area as the discharge orifice **22** in the neck **16** of the receptacle so as to effect the maximum rate of discharge of the contents when these orifices are aligned. However, the minimal area discharge orifice **40** is of a sufficient cross sectional area, smaller than that of the orifice **22**, so that when registered therewith a restricted flow or discharge of the contents of the receptacle may be effected. The purpose of these two sizes of orifices is that when the large orifice is in registration as shown in FIGURE 3, a relatively great rate of discharge of the contents of the receptacle can be effected, as for example when discharging toothpaste, shaving cream or the like. On the other hand, when the smaller area orifice **40** is caused to register, a restricted rate of flow is obtained which is useful when dispensing medicinal preparation from the receptacle. Thus, the same closure member can be utilized for receptacles having different types of contents to be dispensed therefrom.

A sealing means is provided cooperating with the closure sleeve **30** and the receptacle neck **16** and disposed within the latter. In the arrangement shown in FIGURES 1–3, this closure means consists of a cylindrical plunger **42** which is preferably slidably received within the counterbore **18** and is insertable through the open upper end of the latter, the bottom end of this plunger being movable into a sealing and seating engagement upon the annular seat **28** previously mentioned. When so seated, as shown in FIGURE 1, passage of the contents of the receptacle upwardly through the neck **16** is completely prevented from reaching the lateral discharge orifice **22** in the neck as clearly shown in FIGURE 1. However, when the plunger is raised as shown in FIGURE 3, this sealing means is removed and registration between the orifices **38** or **40** is effected depending upon the rotational adjustment of the sleeve with respect to the receptacle neck. In this latter position, the upwardly retracted plunger **42** by its snug sliding fit within the upper end of the counterbore **27** serves to seal the upper end of the latter and prevent the escape of the contents of the receptacle therefrom.

At its upper end, the plunger **42** is provided with a laterally outturned flange **44** and a compression spring **46** is disposed between this flange and the previously mentioned annular surface **20** at the upper end of the neck **16** of the receptacle. The spring surrounds the plunger and yieldingly urges the latter upwardly. Inasmuch as the upper end of the flange **44** abuts against the end wall **32** of the closure sleeve **30**, it is obvious that this spring will yieldingly urge the receptacle closure sleeve and the sealing plunger **42** from the sealed and closed position of FIGURE 1 to their open and dispensing position of FIGURE 3 as soon as the screw threaded locking means **26**, **36** of the neck of the receptacle and the closure sleeve have been disengaged.

Stop means are provided for preventing immediate and quick registration of the orifices in the stem and in the sleeve with each other as soon as the locking means **26**, **36** have been disengaged. This stop means may conveniently comprise an inturned stop lug as at **50** which is struck inwardly from the wall of a retainer cap **52** and is positioned to overlie and be engaged by the flange **34** on the lower end of the sleeve when the latter is moved upwardly under the impetus of the spring **46**. In order to effect complete upward travel of the sleeve and disengage the latter from the action of the stop means **50**, the flange **34** of the sleeve is provided with radially extending notches as at **56**, see FIGURE 2, therein which upon rotational adjustment of the sleeve is adapted to register with the stop projection **50** to permit passage of the flange above this projection. The arrangement is such that when the flange has passed the projection it will abut against the upper wall **58** of the retainer cap **52** as shown in FIGURE 3 and will lie above the inwardly extending stop projection **50**. When in this latter position, the sleeve can then be rotated sufficiently to enable a selected one of the discharge orifices **38** or **40** to be caused to register with the discharge orifice **22** in the neck of the receptacle.

The retainer cap **52** has its lower end received upon the diametrically reduced cylindrical portion **12** of the receptacle and abutting against the shoulder or annular seat **14** thereon. The retainer may be held in place in any suitable manner, as by frictional fit, by screw threads or the like. Preferably, however, the exterior surface of the retainer cap and of the receptacle **10** constitute a flush and smooth continuation of each other.

It will be noted that an axial aperture **60** in the top wall **32** of the sleeve registers with the corresponding bore **62** in the upper end of the sealing plunger **42** to provide a recess which may be utilized to receive the brand flag, price tag or display advertising pertaining to the contents of the receptacle.

In the embodiment of FIGURES 1–3 the sealing plunger **42** is disclosed as constituting a separate element from the closure sleeve **30**. However, as shown in FIGURE 4 it is possible to form these elements as a single member. Thus, as shown in FIGURE 4, the same reference numerals have been applied to the same parts as those described in connection with FIGURES 1–3, it being understood that the construction is identical except for the one-piece construction. Thus, the closure sleeve indicated by the numeral **70** has an integral inwardly projecting re-entrant portion **72** in the form of the closure plug. The same axial bore **74** is provided which corresponds to the aligned bore **60** and **62** of FIGURE 1 and performs the same function. Except for its integral construction, the relationship and the operation of the parts is identical to that previously described. The advantage of this construction is that the entire closure member may be readily formed or molded from suitable plastic materials in a very economical manner.

In FIGURE 5 there is shown a further embodiment of this invention in which the closure assembly is illustrated as being mounted in a somewhat different manner upon the upper end of the receptacle or container **80**, the latter being preferably of the collapsible tube type. In this arrangement the upper end of the receptacle is provided with an inturned end wall as at **82** from which rises a peripheral upstanding sleeve **84** whose uppermost edge as shown in dotted lines at **86** is adapted to be folded over or pressed downwardly to provide an annular retaining flange as at **88** by means of which the closure assembly is permanently secured to the upper end of the receptacle.

This retaining flange **88** clamps between itself and the end wall **82** of the receptacle the annular flange **90** at the lower end of a conical or frusto-conical retaining cap **92** having a top wall **94**, which is apertured as at **96** to slidably and rotatably receive therein the closure sleeve **98**. Rising from the central portion of the top wall **82** of the receptacle is a neck portion **16** which is identical in construction with that set forth in connection with FIGURES 1–3 and therefore has its corresponding parts referred to by the same reference numerals.

The sleeve **98** is shown as having a re-entrant integral plunger or sealing body **100** which cooperates with the counterbore **27** and with the sealing shoulder or seat **28** in the same manner as the sealing plunger **72** of FIGURE 4.

Since the operation of this form of the invention is identical with that previously described, a further description of the same is deemed to be unnecessary.

In the arrangement and modification of FIGURE 6 a construction closely resembling that of FIGURE 5 is disclosed. Here the container **110** has a radially thickened annular upper edge as at **112** having a recessed annular seat **114** in its upper end. The circumferentially extending groove **116** formed in the thickened edge or rim **112** is provided. Received within the seat **114** is the

annular flange **118** of the stem or neck **120** which is of the same construction as the stems or necks **16** previously described and thus is provided with the same reference numerals for corresponding portions thereof. Thus the cooperating threads **26** and **36** of the neck **120** and of the lower portion of the sleeve or closure member **122** cooperate to rotationally and slidably position the sleeve upon the neck. At its lower end the sleeve has the laterally outturned flange **34** previously mentioned which cooperates with the locking stop **50** as previously described. Similarly, there is provided the same sealing plunger **42** slidably received in the countersunk bore **27** in the neck **120** and cooperating with the annular sealing surface or seat **28**. The laterally directed discharge orifice **22** in the neck similarly cooperates with discharge orifices **38** and **40** in the sleeve. Finally, a compression spring **46** seating upon the annular seating surface **20** at the upper end of the neck **120** abuts against the annular outturned flange **44** of the sealing plunger **42** to thus yieldingly urge the plunger and the top wall **32** of the sleeve **122** to an upward position. The same axial bores **60** and **62** are provided as in FIGURES 1–3 and for the same purpose. The operation of this form of the invention except as to the construction of the retaining and mounting means by which the closure assembly is secured to the receptacle is identical to that previously described.

FIGURE 7 shows still another construction similar to FIGURES 5 and 6 but in which the over-all height or length of the receptacle and its closure assembly is reduced to some extent by recessing or embedding the closure assembly within the volume of the receptacle. Thus, the same receptacle **110** and with the same reference numerals for its component parts is provided as that discussed in connection with FIGURE 6. Here, however, is provided an end wall **130** seated in the recess **114** and retained thereon as by a retainer lid **132** having a depending rim **134** which embraces the thickened edge **112** of the upper end of the receptacle and has an inturned annular flange **136** seating in the annular groove **116** to thereby lock end wall **130** upon which is mounted the dispensing closure, to the receptacle.

This retainer lid **132** is provided with an aperture **138** through which is slidably received the cylindrical closure sleeve **140**. The closure sleeve has an outturned flange **142** at its lower end which is slidable within the cylindrical bore **144** provided in a re-entrant sleeve **146** carried by the end wall **130** and which extends downwardly into the interior of the receptacle. An inturned or inwardly struck projection **150** on the retainer lid **132** and projecting into the cylindrical chamber **144** cooperate with the flange **142** as previously described.

A diametrically reduced cylindrical neck or stem **152** is carried by the annular inwardly directed flange **154** at the lower end of the re-entrant sleeve **146** and projects upwardly through the opening **138** and to the exterior of the receptacle. This neck or stem **152** is provided with a closure sleeve **140** and as described in the preceding embodiments, this closure sleeve **140** is provided with the discharge orifices **158** and **160** which cooperate with the discharge orifice **162** formed in the stem or neck **152**. The compression spring **164** is disposed between the annular shoulder **166** on the upper end of the stem **152** and an annular flange **168** projecting outwardly from the closure or sealing plug **170** which is slidable in the counterbore **172** formed within the stem **152** which cooperates with the sealing seat **174** therein. As in the preceding embodiment, registering apertures **180** and **182** are provided at the top wall **184** of the sleeve and in the sealing plunger **170** for the same purpose previously set forth. The operation of this form of the invention is identical to that previously described except for the specific construction of the mounting of the closure assembly and its relationship to the upper end of the receptacle.

A somewhat different construction of closure assembly is provided for receptacles of a more rigid type such as

bottles and the like. Thus, as shown in FIGURE 8 a receptacle **200** of glass or other suitable material of any desired shape is provided with a cylindrical neck **202** having a diametrically reduced upper portion **204** which is provided with external screw threads as at **206**. In the arrangement of FIGURE 8 the numeral **210** designates generally an attachable neck extension for the bottle. This extension consists of a neck **212** which is identical with the necks **16** or **152** of the previously described embodiments and thus is provided with the same reference numerals to designate the same structural features. This neck is coaxially positioned within a cylindrical mounting sleeve **214** with which it is integrally united therewith by an annular web **216** at the lower ends of each of these members. At the upper end of the mounting sleeve **214** there is provided an outturned annular flange **218** which is adapted to seat as by means of a leakproof gasket **220** upon the upper end of the neck portion **204** of the bottle. Slidably received for rotational and sliding movement upon the neck **212** is the closure sleeve **222** which is identical with the closure sleeve members previously described in connection with the embodiments of FIGURES 1–3 or FIGURE 4 and thus is provided with the same reference numerals with respect thereto.

A retaining cap is provided for removably but fixedly securing the neck extension **210** to the neck of the bottle **200**. Thus, there is provided an internally threaded gland **224** which engages the threads **206** and has a wall **226** at its upper end which wall is apertured as at **228** to rotatably and slidably receive the sleeve **222** therethrough, is further apertured as at **230** to receive an upwardly projecting locating pin **232** carried by the previously mentioned annular flange **218** and is further provided with vent apertures as at **234**. In this form of the invention, however, the previously mentioned locking means such as that shown at **50**, in FIGURES 1–3 and **56** in FIGURE 2 is no longer necessary and these are omitted. Instead, the annular outturned flange **236** at the lower end of the closure sleeve **222** is engaged upon a gasket **238** or the like which may be adhesively secured thereto and which thus rests upon the bottom web **216** establishing a tight sealing engagement therewith, and also closing the vent opening **240** formed in a depending tubular stem **242** carried by the web **216** and opening into the annular space **244**. A vent conduit **246** is secured to and surrounds the tubular extension **242** and terminates adjacent the lower end of the receptacle for the purpose of admitting air to the interior of the latter when the receptacle is inverted to permit discharge of its contents.

A cylindrical retainer cap **254** having a closure top wall **252** is provided with a recess **258** and a depending skirt **256** which abuts against the top surface of the retainer gland **224**.

In assembling this form of the invention the sealing plunger **42** and the spring **46** are properly assembled within the sleeve **222** and the sealing ring or gasket **238** is then positioned and these elements are then placed about the neck **212**. Thereupon the threaded portions of the neck and sleeve are engaged to move the closure cap into its closing position so that the discharge orifices **38** and **22** are moved out of registration and the sealing ring or gasket **238** is caused to close the venting passage **240**. The plastic tube **246** is then positioned upon the venting extension **242** whereupon the closure assembly is placed upon the neck of the bottle and secured in place by the retaining gland **224**. Thereafter, the cylindrical retainer cap **254** is placed in position and a seal and/or revenue, excise tax stamp **250** is affixed in a generally acceptable tamper-proof manner.

Obviously this form of the invention may be utilized with other types of containers and in conjunction with the various other arrangements of closure assemblies herein described.

The form of the invention and the operation of the same as shown in FIGURE 9 is very similar to that of FIGURES 1–3. Thus the same type of collapsible tube **10** is provided with the same numerals being applied to corresponding parts thereof.

The cylindrical closure sleeve **260**, see FIGURE 11, has its annular base flange **262** provided with diametrically opposed notches **264** on the opposite sides thereof which are adapted to cooperate with the stop projection **50** previously described in connection with the preceding embodiment. The notches **264** each extend about twenty-five degrees of circumferential extent of the flange. Disposed between the notched annular base flange **262** the sleeve **260** is provided with a circular discharge orifice **266** on one side and with a rectangular discharge orifice **268** diametrically opposite the same.

This form of the invention is particularly adapted for use with a collapsible metal tube having a closure sleeve **260** formed of a suitable metal with a rolled-on thread at the base of the closure sleeve **260**.

In using this form of the invention, the closure sleeve is unscrewed in the same manner as previously described and when thrust upwardly by the spring **46** is then rotationally adjusted to properly register the selected discharge orifice **266** or **268** with the discharge orifice **22** in the neck **16** of the tube. Thus by using this form of the invention, the contents of the tube such as toothpaste or the like can be selectively dispensed either as a round stream or as a ribbon-like stream depending upon the orifice selected. Further, it will be noted that in this form of the invention as in the preceding forms except that of FIGURE 8, the disposition of the flange **262** above the stop projection **50** prevents accidental downward displacement of the closure sleeve and thus prevents an accidental wasteful discharge of the contents of the receptacle. In order to return the sleeve to its closed position it is necessary to rotationally register the notch **264** of the sleeve with the locking pin or lug **50** in order to move the sleeve downward and thus engage the locking threads, and seal contents of tube.

FIGURE 10 shows the position of the parts of FIGURE 9 but in the dispensing position.

The arrangement of FIGURE 12 is a perspective view showing the principles of FIGURE 11 applied to the integral sleeve and plunger construction **72** of FIGURE 4.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents, fall within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A closure assembly for receptacles of the type having an elongated open ended neck with a lateral discharge orifice intermediate the ends of said neck; said closure assembly comprising a closure member disposed entirely outside of said neck and including a sleeve slidably embracing said neck, an end wall closing the upper end of said sleeve and overlying the open end of said neck which is remote from said receptacle, said sleeve having intermediate its ends discharge openings of different cross-sectional areas individually selectively registerable with said discharge orifice, said sleeve being mounted upon said neck for straight line sliding movement for selectively placing said openings and orifice into and out of registration, retaining means on said sleeve and neck for releasably but immovably securing said sleeve to said neck and retaining said openings and orifice out of registration with said orifice being closed by said sleeve, a circumferentially extending outwardly projecting flange on said sleeve, restraining means engageable by said flange for limiting sliding movement of said sleeve upon said neck and preventing movement of said sleeve to an orifice registering position after disconnection of said retaining means, a retaining cap removably secured to said receptacle and surrounding and retaining said sleeve upon said neck, said cap having an end wall with an opening through which said sleeve is movable, said restraining means including an inwardly projecting member on said retaining cap adjacent to and below its end wall and in the path of straight line sliding movement of said flange, said flange having a notch registerable with said member for passage thereby upon rotation of said sleeve, the distance between said member and said end wall being substantially equal to the thickness of the flange whereupon further rotation of said flange after passing said member will cause said flange to be held captive between said member and end wall, the last named position of said flange defining an orifice registering position of said sleeve and neck.

2. The combination of claim 1 including resilient means disposed within said sleeve and engaging the top of said neck and said sleeve and yieldingly urging the latter towards registration of said discharge orifices.

3. The combination of claim 1 including a sealing means disposed within and movable with said sleeve and movable within said neck and movable to cover and uncover said neck discharge orifice while sealing and closing the open end of said neck.

4. The combination of claim 3 including an annular seat in said neck on the upstream side of said neck discharge orifice, said sealing means being sealingly engageable with said annular seat when said orifices are out of registration.

5. The combination of claim 4 wherein said sealing means comprises a plunger disposed concentrically in said sleeve and slidable within said neck.

6. The combination of claim 5 including resilient means disposed within said sleeve and engaging the top of said neck and said sleeve and yieldingly urging the latter towards registration of said discharge orifices, said resilient means engaging said plunger and urging the latter outwardly against said sleeve.

References Cited in the file of this patent

UNITED STATES PATENTS

1,760,946	Hemmerstein	June 3, 1930
1,929,794	Roselle	Oct. 10, 1933
2,699,885	McClure	Jan. 18, 1955
2,721,004	Schultz	Oct. 18, 1955

FOREIGN PATENTS

228,028	Great Britain	Jan. 29, 1925